

In the Claims:

1-22. (Canceled)

23. (Currently Amended) A method for illuminating a semiconductor structure having a topmost photoresist layer, the method comprising:

providing the semiconductor structure having the photoresist layer, the photoresist layer having a thickness of less than 5000 angstroms formed on a surface thereof;

introducing an immersion fluid into a space between an optical surface and the photoresist layer; and

directing optical energy through the immersion fluid and onto the photoresist layer, the directing not being started until after the photoresist layer has been completely diffused with the immersion fluid.

24. (Original) The method of claim 23 wherein the immersion fluid comprises water.

25. (Original) The method of claim 23 wherein the optical energy comprises light having a wavelength of less than about 450 nm.

26. (Original) The method of claim 23 wherein the optical surface comprises silicon oxide.

27. (Original) The method of claim 23 wherein the optical surface comprises calcium fluoride.

28. (Previously Presented) The method of claim 23 wherein the photoresist layer comprises a chemically amplified photoresist layer.

29. (Original) The method of claim 23 wherein the immersion fluid is in contact with a portion of the photoresist layer.
30. (Original) The method of claim 23 wherein the semiconductor structure is immersed in the immersion fluid.
31. (Original) The method of claim 23 further comprising a stage underlying the semiconductor structure.
32. (Original) The method of claim 31 wherein the stage is immersed in the immersion fluid.
33. (Previously Presented) The method of claim 23 further comprising developing the photoresist layer.
34. (Previously Presented) The method of claim 33 wherein developing the photoresist layer comprises immersing the photoresist layer in a tetramethylammonia hydroxide solution.
- 35-36. (Canceled)
37. (Currently Amended) A method of fabricating a semiconductor device, the method comprising:
- providing a semiconductor wafer;
 - forming a photoresist layer over the semiconductor wafer, the photoresist layer having a thickness of less than about 5000 angstroms;
 - introducing an immersion fluid into a space between an optical surface and the photoresist layer, the immersion fluid contacting the photoresist layer and being diffused

substantially throughout the photoresist layer;

patterning the photoresist layer by directing optical energy through the immersion fluid and onto the photoresist layer, the patterning not being performed until after the immersion fluid is diffused substantially throughout the photoresist layer;

removing portions of the photoresist layer in accordance with a pattern from the patterning step; and

processing the semiconductor wafer using remaining portions of the photoresist layer as a mask.

38. (Original) The method of claim 37 wherein the immersion fluid comprises water.

39. (Previously Presented) The method of claim 37 wherein the optical energy comprises light having a wavelength of less than 450 nm.

40. (Original) The method of claim 37 wherein the optical surface comprises silicon oxide.

41. (Original) The method of claim 37 wherein the optical surface comprises calcium fluoride.

42. (Previously Presented) The method of claim 37 wherein the photoresist layer comprises a chemically amplified photoresist layer.

43. (Original) The method of claim 37 wherein the semiconductor wafer is immersed in the immersion fluid.

44. (Original) The method of claim 37 further comprising placing the semiconductor wafer on a stage.
45. (Original) The method of claim 44 wherein the stage is immersed in the immersion fluid.
46. (Previously Presented) The method of claim 37 and further comprising developing the photoresist layer.
47. (Previously Presented) The method of claim 46 wherein the step of developing the photoresist layer comprises immersing the photoresist layer in a tetramethylammonia hydroxide solution.
48. (Original) The method of claim 47 wherein the optical energy has a wavelength of less than 450 nm.
49. (Previously Presented) The method of claim 37 wherein providing the semiconductor wafer comprises providing a semiconductor wafer with a layer of material deposited thereon, wherein forming the photoresist layer comprises forming a photoresist layer over the layer of material, and wherein processing the semiconductor wafer comprises etching the layer of material.
50. (Original) The method of claim 49 wherein the layer of material comprises a conductive layer.
51. (Original) The method of claim 50 wherein processing the semiconductor wafer comprises etching the conductive layer into gate electrodes.

52. (Previously Presented) The method of claim 51 wherein each gate electrode has a minimum dimension of 50 nm or less.
53. (Original) The method of claim 49 wherein the layer of material comprises a dielectric layer.
54. (Original) The method of claim 53 wherein processing the semiconductor wafer comprises forming trenches in the dielectric layer, the method further comprising filling the trenches with a conductor.
55. (Canceled)
56. (Previously Presented) The method of claim 61 wherein the converting is performed at least in part by plasma treating the upper portion of the photoresist layer.
57. (Canceled)
58. (Previously Presented) The method of claim 61 wherein the converting is performed at least in part by performing a chemical treatment on the upper portion of the photoresist layer.
59. (Previously Presented) The method of claim 61 wherein the converting is performed at least in part by performing an ion implantation process on the upper portion of the photoresist layer.
60. (Previously Presented) The method of claim 61 wherein the converting is performed at least in part by performing a thermal treatment on the upper portion of the photoresist layer.

61. (Currently Amended) A method of fabricating a semiconductor device, the method comprising:

providing a semiconductor wafer;

forming a photoresist layer over the semiconductor wafer;

converting only an upper portion of the photoresist layer into a treated layer;

immersing the semiconductor wafer in an immersion fluid after the converting, the converting being a separate process from the immersing; and

patterning the photoresist layer by directing optical energy through the immersion fluid toward the photoresist layer.

62. (Previously Presented) The method of claim 61 wherein the immersion fluid comprises water.

63. (Previously Presented) The method of claim 61 wherein the optical energy comprises light having a wavelength of less than about 450 nm.

64. (Previously Presented) The method of claim 61 wherein the photoresist layer comprises a chemically amplified photoresist layer.

65. (Previously Presented) The method of claim 61 wherein the step of patterning the photoresist layer comprises immersing the photoresist layer in a tetramethylammonia hydroxide solution.